REMARKS

This response is made to the Official Action dated September 7, 2001. At the time the Office Action was mailed, claims 1-63 were pending. Claims 2, 18, and 34 have been cancelled without prejudice. Independent claims 1, 15, 33, 47 and 54 have been amended to set forth the subject matter of the invention more clearly. Claims 3, 13, 19, 29, 35 and 45 have been amended to recite proper dependency in light of the cancelled claims. Claims 4-12, 20-28, 36-44, 49-52 and 56-63 have been amended to provide proper antecedent basis in light of the amended independent claims on which they depend. Reconsideration of the application as amended is respectfully requested.

Rejections Under 35 U.S.C. § 102

The Examiner rejected claims 1-4, 9, 11-20, 25, 27-37, 41, 43-48, 53-60, 62 and 63 under 35 U.S.C. § 102(e) as being anticipated by Mostafazadeh et al. (U.S. Patent No. 5,783,870). The Examiner's rejections are too lengthy to be reproduced efficiently herein. Applicants have amended independent claims 1, 15, 33, 47 and 54 to set forth the subject matter of the invention more clearly. Nonetheless, Applicants respectfully traverse this rejection.

Anticipation under section 102 can be found only if a single reference shows exactly what is claimed. *Titanium Metals Corp. v. Banner*, 778 F.2d 775, 227 U.S.P.Q. 773 (Fed. Cir. 1985). For a prior art reference to anticipate under section 102, every element of the claimed invention must be identically shown in a single reference. *In re Bond*, 910 F.2d 831, 15 U.S.P.Q.2d 1566 (Fed. Cir. 1990). To maintain a proper rejection under section 102, a

single reference must teach each and every element or step of the rejected claim. *Atlas Powder v. E.I. du Pont*, 750 F.2d 1569 (Fed. Cir. 1984). Thus, if the claims recite even one element not found in the cited references, the reference does not anticipate the claimed invention.

Each of the independent claims 1, 15, 33, 47 and 54 recites, in relevant part, a package comprising a plurality of mateable alignment features. It is clear from the present specification that the alignment features are structural appendages protruding from or receding into the surface of each package that are formed to mate with alignment features on adjacent packages. The alignment features facilitate stacking the packages in a stable manner and ensure that each package is aligned with respect to each adjacent package. The alignment features are also used to support the weight of the package during reflow of the solder balls. Finally, the alignment features are used to orient the package about an axis which is perpendicular to the package. (Page 8, lines 12-18).

While Applicants contend that the alignment features claimed in the present application, particularly when viewed in light of the specification, adequately distinguish over the prior art cited by the Examiner, Applicants have amended the present claims to include the term "mateable" to set forth the claimed subject matter more clearly and thereby eliminate any apparent confusion. It should be clear from the present specification that although the term "mateable" is not explicitly recited, a detailed illustration of male and female alignment features is present on Page 10, line 4 – Page 11, line 19 and with specific reference to Figs. 6-8. Therefore, it should be clear that the thorough disclosure of male and

female alignment features assures that no new matter is being presented with regard to the term "mateable," since the term is inherently implied by the descriptions of the male and female alignment features. The term is being used solely to clarify the claimed subject matter.

Contrary to the claimed subject matter, and notwithstanding the Examiner's rejection, Mostafazadeh et al. does not disclose mateable alignment features. In his rejection, the Examiner cites elements 103 and 119 of Mostafazadeh et al. as the alignment features recited in the present claims. Element 103 refers to a bonding pad, while element 119 refers to epoxy. In view of the present specification, it is untenable to suggest that the bonding pads or epoxy could in any way be equated to the alignment features recited in the present claims. To be clear, the alignment features presently claimed provide proper alignment and orientation of a package with respect to adjacent packages. The pads and epoxy used in coupling adjacent packages in Mostafazadeh et al. in no way insure proper alignment and orientation. Further, with the recitation of mateable alignment features, as set forth in the amended claims, it should be clear that Mostafazadeh et al. does not recite all of the elements of the claimed subject matter.

In view of the remarks and amendments set forth above, Applicants respectfully submit that the subject matter of claims 1-4, 9, 11-20, 25, 27-37, 41, 43-48, 53-60, 62 and 63 is not anticipated by Mostafazadeh et al. since the present claims clearly recite elements not found in the cited reference. Accordingly, Applicants request withdrawal of the Examiner's rejection and allowance of claims 1-4, 9, 11-20, 25, 27-37, 41, 43-48, 53-60, 62 and 63.

Rejections Under 35 U.S.C. § 103

The Examiner rejected claims 5-8, 10, 21-24, 26, 37-40, 42, 49-52, 56-59 and 61 under 35 U.S.C. § 103(a) as being unpatentable over Mostafazadeh et al. (U.S. Patent No. 5,783,870). The Examiner's rejections are too lengthy to be reproduced efficiently herein. However, Applicants respectfully traverse this rejection.

The burden of establishing a *prima facie* case of obviousness falls on the Examiner. *Ex parte Wolters and Kuypers*, 214 U.S.P.Q. 735 (PTO Bd. App. 1979). Obviousness cannot be established by combining or modifying the teachings of the prior art to produce the claimed invention absent some teaching or suggestion support the combination. *ACS Hospital Systems, Inc. v. Montefiore Hospital*, 732 F.2d 1572, 1577, 221 U.S.P.Q. 929, 933 (Fed. Cir. 1984). Accordingly, to establish a *prima facie* case, the Examiner must not only show that the combination or modification includes all of the claimed elements, but also present a convincing line of reasoning as to why one of ordinary skill in the art would have found the claimed invention to have been obvious in light of the teachings of the references. *Ex parte Clapp*, 227 U.S.P.Q. 972 (B.P.A.I. 1985). When prior art references require a selected combination or modification to render obvious a subsequent invention, there must be some reason for the combination or modification other than the hindsight gained from the invention itself, i.e., something in the prior art as a whole must suggest the desirability, and thus the obviousness, of making the combination or modification. *See Uniroyal Inc. v. Rudkin-Wiley Corp.*, 837 F.2d 1044, 5 U.S.P.Q.2d 1434 (Fed. Cir. 1988).

The Examiner stated that Mostafazadeh et al. is silent in disclosing a system with different configurations of male and female alignment features. The Examiner then states that "it would have been an obvious matter of design choice to one of ordinary skill in the use of different kinds of connectors such as male and female connectors aligned on each first or second alignment of the package depend upon the other package's connectors to be connective." As previously discussed, the Examiner points to bonding pads 103 and epoxy 119 as providing the necessary element of alignment features recited in the present claims. Applicants do not comprehend how bonding pads or epoxy can possibly be described as male or female, and respectfully submit that this is the reason that Mostafazadeh et al. is silent in this regard. Claims 5-8, 10, 21-24, 26, 37-40, 42, 49-52, 56-59 and 61 recite exemplary embodiments of the claimed invention which include male and/or female mateable alignment features. Applicants respectfully submit that the bonding pads and epoxy disclosed in Mostafazadeh et al. are incapable of being male or female and that such an impossible modification of the structures recited in Mostafazadeh et al. cannot possibly be an obvious matter of design choice to one of ordinary skill in the art. Mostafazadeh et al. does not recite all of the elements recited in the claimed subject matter. Further, the obvious modification suggested by the Examiner cannot possibly provide support for the missing elements. Accordingly, Applicants request withdrawal of the Examiner's rejection and allowance of claims 5-8, 10, 21-24, 26, 37-40, 42, 49-52, 56-59 and 61.

Attachment

Attached hereto is a marked-up version of the changes made to the specification and claims by the current amendment. The attached page is captioned "**VERSION WITH MARKINGS TO SHOW CHANGES MADE.**"

Conclusion

In view of the above remarks and amendments set forth above, Applicant respectfully requests allowance of claims 1, 3-17, 19-33, and 35-63. If the Examiner believes that a telephonic interview will help speed this application toward issuance, the Examiner is invited to contact the undersigned at the telephone number listed below.

Respectfully submitted,

Date: December 7, 2001

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

1 (Once Amended). A system comprising:

a processor; and

a memory device operatively coupled to the processor, the memory device comprising a plurality of vertically stacked ball grid arrays, each ball grid array having a memory chip, and wherein the vertically stacked ball grid arrays comprise:

a plurality of packages, each of the plurality of packages comprising a plurality of mateable alignment features, and wherein each of the plurality of packages is physically coupled to another of the plurality of packages; and

a plurality of memory chips, each of the plurality of memory chips physically coupled to a respective one of the plurality of packages.

3 (Once Amended). The system, as set forth in claim 1[2], wherein each package comprises:

a molded resin body having a die side and a wire side.

4 (Once Amended). The system, as set forth in claim 3, wherein each package comprises:

a plurality of first mateable alignment features on the die side of the package; and

a plurality of second mateable alignment features on the wire side of the package.

5 (Once Amended). The system, as set forth in claim 4, wherein the plurality of first mateable alignment features are male and the plurality of second mateable alignment features are female.

6 (Once Amended). The system, as set forth in claim 4, wherein the plurality of first mateable alignment features are male and the plurality of second mateable alignment features are male.

7 (Once Amended). The system, as set forth in claim 4, wherein the plurality of first mateable alignment features are female and the plurality of second mateable alignment features are male.

8 (Once Amended). The system, as set forth in claim 4, wherein the plurality of first mateable alignment features are female and the plurality of second mateable alignment features are female.

9 (Once Amended). The package, as set forth in claim 4, wherein the plurality of first mateable alignment features and the plurality of second mateable alignment features orient adjacent packages in a unique location.

10 (Once Amended). The package, as set forth in claim 9, wherein the plurality of first mateable alignment features and the plurality of second mateable alignment features are arranged asymmetrically.

11 (Once Amended). The package, as set forth in claim 9, wherein the plurality of first mateable alignment features and the plurality of second mateable alignment features comprising of at least one unique alignment feature.

12 (Once Amended). The package, as set forth in claim 4, wherein the plurality of first mateable alignment features and the plurality of second mateable alignment features support adjacent packages during solder ball reflow.

13 (Once Amended). The system, as set forth in claim 1[2], wherein each of the plurality of packages is electrically coupled to another of the plurality of packages using solder balls.

15 (Once Amended). A memory board comprising:

a substrate; and

a memory device operatively coupled to the substrate, the memory device comprising a plurality of vertically stacked ball grid arrays, each ball grid array having a memory chip, and wherein the vertically stacked ball grid arrays comprise:

a plurality of packages, each of the plurality of packages comprising a plurality of mateable alignment features, and wherein each of the plurality of packages is physically coupled to another of the plurality of packages; and

a plurality of memory chips, each of the plurality of memory chips coupled to a respective one of the plurality of packages.

19 (Once Amended). The memory board, as set forth in claim 15[18], wherein the package comprises:

a molded resin body having a die side and a wire side.

20 (Once Amended). The memory board, as set forth in claim 19, wherein the molded resin package comprises:

a plurality of first mateable alignment features on the die side of the package; and

a plurality of second mateable alignment features on the wire side of the package.

21 (Once Amended). The memory board, as set forth in claim 20, wherein the plurality of first mateable alignment features are male and the plurality of second mateable alignment features are female.

22 (Once Amended). The memory board, as set forth in claim 20, wherein the plurality of first mateable alignment features are male and the plurality of second mateable alignment features are male.

23 (Once Amended). The memory board, as set forth in claim 20, wherein the plurality of first mateable alignment features are female and the plurality of second mateable alignment features are male.

24 (Once Amended). The memory board, as set forth in claim 20, wherein the plurality of first mateable alignment features are female and the plurality of second mateable alignment features are female.

25 (Once Amended). The package, as set forth in claim 20, wherein the plurality of first mateable alignment features and the plurality of second mateable alignment features orient adjacent packages in a unique location.

26 (Once Amended). The package, as set forth in claim 25, wherein the plurality of first mateable alignment features and the plurality of second mateable alignment features are arranged asymmetrically.

27 (Once Amended). The package, as set forth in claim 25, wherein the plurality of first mateable alignment features and the plurality of second mateable alignment features comprising of at least one unique alignment feature.

28 (Once Amended). The package, as set forth in claim 20, wherein the plurality of first mateable alignment features and the plurality of second mateable alignment features support adjacent packages during solder ball reflow.

29 (Once Amended). The memory board, as set forth in claim 15[18], wherein each of the plurality of packages is electrically coupled to another of the plurality of packages using solder balls.

33 (Once Amended). A stacked ball grid array comprising:

a plurality of packages, each of the plurality of packages comprising a plurality of mateable alignment features, and each of the plurality of packages coupled to another of the plurality of packages; and

a plurality of memory chips, each of the plurality of memory chips coupled to a respective one of the plurality of packages.

35 (Once Amended). The stacked ball grid array, as set forth in claim 33[34], wherein the package comprises:

a molded resin body having a die side and a wire side.

36 (Once Amended). The stacked ball grid array, as set forth in claim 35, wherein the molded resin package comprises:

a plurality of first mateable alignment features on the die side of the package; and

a plurality of second mateable alignment features on the wire side of the package.

37 (Once Amended). The stacked ball grid array, as set forth in claim 36, wherein the plurality of first mateable alignment features are male and the plurality of second mateable alignment features are female.

38 (Once Amended). The stacked ball grid array, as set forth in claim 36, wherein the plurality of first mateable alignment features are male and the plurality of second mateable alignment features are male.

39 (Once Amended). The stacked ball grid array, as set forth in claim 36, wherein the plurality of first mateable alignment features are female and the plurality of second mateable alignment features are male.

40 (Once Amended). The stacked ball grid array, as set forth in claim 36, wherein the plurality of first mateable alignment features are female and the plurality of second mateable alignment features are female.

41 (Once Amended). The package, as set forth in claim 36, wherein the plurality of first mateable alignment features and the plurality of second mateable alignment features orient adjacent packages in a unique location.

42 (Once Amended). The package, as set forth in claim 41, wherein the plurality of first mateable alignment features and the plurality of second mateable alignment features are arranged asymmetrically.

43 (Once Amended). The package, as set forth in claim 41, wherein the plurality of first mateable alignment features and the plurality of second mateable alignment features comprising of at least one unique alignment feature.

44 (Once Amended). The package, as set forth in claim 36, wherein the plurality of first mateable alignment features and the plurality of second mateable alignment features support adjacent packages during solder ball reflow.

45 (Once Amended). The stacked ball grid array, as set forth in claim 33[34], wherein each of the plurality of packages is electrically coupled to another of the plurality of packages using solder balls.

47 (Once Amended). A device comprising:

a chip; and

a package operatively coupled to the chip, the package comprising:

a first side;

a second side;

a plurality of first mateable alignment features on the first side of the package; and

a plurality of second mateable alignment features on the second side of the package.

49 (Once Amended). The device, as set forth in claim 47, wherein the plurality of first mateable alignment features are male and the plurality of second mateable alignment features are female.

50 (Once Amended). The device, as set forth in claim 47, wherein the plurality of first mateable alignment features are male and the plurality of second mateable alignment features are male.

51 (Once Amended). The device, as set forth in claim 47, wherein the plurality of first mateable alignment features are female and the plurality of second mateable alignment features are male.

52 (Once Amended). The device, as set forth in claim 47, wherein the plurality of first mateable alignment features are female and the plurality of second mateable alignment features are female.

54 (Once Amended). A package comprising:

a first side;

a second side;

a plurality of first mateable alignment features on the first side of the package; and

a plurality of second mateable alignment features on the second side of the package.

56 (Once Amended). The package, as set forth in claim 54, wherein the plurality of first mateable alignment features are male and the plurality of second mateable alignment features are female.

57 (Once Amended). The package, as set forth in claim 54, wherein the plurality of first mateable alignment features are male and the plurality of second mateable alignment features are male.

58 (Once Amended). The package, as set forth in claim 54, wherein the plurality of first mateable alignment features are female and the plurality of second mateable alignment features are male.

59 (Once Amended). The package, as set forth in claim 54, wherein the plurality of first mateable alignment features are female and the plurality of second mateable alignment features are female.

60 (Once Amended). The package, as set forth in claim 54, wherein the plurality of first mateable alignment features and the plurality of second mateable alignment features orient adjacent packages in a unique location.

61 (Once Amended). The package, as set forth in claim 60, wherein the plurality of first mateable alignment features and the plurality of second mateable alignment features are arranged asymmetrically.

62 (Once Amended). The package, as set forth in claim 60, wherein the plurality of first mateable alignment features and the plurality of second mateable alignment features comprising of at least one unique alignment feature.

63 (Once Amended). The package, as set forth in claim 54, wherein the plurality of first mateable alignment features and the plurality of second mateable alignment features support adjacent packages during solder ball reflow.